95 22. (amended) A nonaqueous electrolyte secondary battery according to claim 19, wherein the positive electrode and the negative electrode further comprises a binder selected from the group consisting essentially of a polyvinylidene fluoride, a polytetrafluoroethylene, an ethylene-propylene-diene copolymer, and a styrene-butadiene rubber.

96 27. (amended) A nonaqueous electrolyte secondary battery according to claim 25, wherein the electrolyte solution comprises $LiPF_6$.

REMARKS

The examiner objected to the drawing on the ground that in Figure 1, reference sign 20 does not appear in the specification. As can be seen by the above amendment, the paragraph beginning at page 7, line 22, has been amended to reflect that reference sign 20 belongs to the collector. Therefore, this ground for objection has been overcome.

The examiner also objected to Figures 2-4, because it was not clear what the squares and triangles refer to. As can be seen in the amended figures, Figures 2 through 4 have been amended to delete the squares and triangles. Therefore, this ground for rejection has also been overcome.

The examiner objected to the specification and rejected claim 13 under 35 U.S.C. § 112, second paragraph, because the specification does not provide support for the phrase "nucleic acids" appearing in claim 13. As can be seen by the above amendments, claim 13 has been amended to use the phase "nonaqueous electrolyte solution." Support for this amendment is found, *inter alia*, at page 6, lines 6-8 of the instant specification, so that it can be seen that no new matter has been added. Therefore, the objection and the rejection of claim 13 under 35 U.S.C. § 112, second paragraph have been overcome.

The examiner also objected to the specification and rejected claim 18 under 35 U.S.C. § 112, second paragraph, , because the specification does not provide support for the phase "average length" appearing in claim 18. As can be seen by the above amendments, claim 18 has been amended to use the phrase "average thickness." Support for this amendment is found at page 9, lines 8 and 9 of the instant specification, so that it can be seen that no new matter has been added. Therefore, the objection and the rejection of claim 13 under 35 U.S.C. § 112, second paragraph have been overcome.

The examiner requested that misnumered claim 26 (second occurrence) be renumbered as claim 27.. As can be seen by the above amendments, the examiner's request has been honored.

The examiner objected to claim 22, because it employed improper Markush terminology. As can be seen by the above amendments, claim 22 has been amended to use proper terminology. Therefore, this ground for rejection has been overcome. Attached is a Version with Marking to Show Changes Made.

The examiner rejected claims 7 and 20 under 35 U.S.C. § 112, second paragraph as being indefinite, on the ground that the values of x and y in the formula LiMxOy are unclear. Applicants respectfully disagree. The claims also recite that "M is at least one selected from the group consisting of Co, Ni, Mn, Fe, Al, V, and Ti." Using only the most elementary principles of stoichiometry, one of ordinary skill in the art will be able to ascertain what combinations of M an O are required to provide an anion with the single negative charge needed to balance the lithium's single positive charge. Therefore, claims 17 and 20 define the patentable subject matter with a *reasonable* degree of particularity and distinctness. (M.P.E.P. 2173.02.) Consequently, this ground for rejection should be withdrawn.

The examiner rejected claims 1, 2, 4-9, 11-14, 16, 17, 19-21, 24, 26, and 27 under 35 U.S.C. § 102(b) as anticipated by JP 08-287952 A. This reference discloses an nonaqueous electrolyte secondary batter having a negative electrode formed with two distinct layers of carbon material. A layer of spherical graphite is formed so that it contacts the collector. A second layer of scale-shaped graphite is then formed on the surface of the electrode. Fibered graphite can be added to either or both of the two layers.

This reference does not disclose a negative electrode formed with both carbon fibers and carbon flakes disposed in the particulate negative electrode active material. Therefore, JP 08-287952 A does not anticipate any of claims 1, 2, 4-9, 11-14, 16, 17, 19-21, 24, 26, or 27.

The examiner rejected claims 1, 6, and 7 under 35 U.S.C. § 102(e) as anticipated by Inoue *et al.* This reference merely discloses a laundry list of materials that might be used as the negative electrode material. It does not disclose a negative electrode material made of carbon fibers and carbon flakes disposed in a particulate negative electrode active material, where the ratio by weight of the carbon fibers to the carbon flakes in the negative electrode is in a range of 0.2 to 100. Therefore, Inoue *et al.* does not anticipate any of claims 1, 6 or 7.

The examiner rejected claims 1-27 under 35 U.S.C. § 103(a) as obvious in light of a combination of EP 0871233 and JP 09-027344 A. Reconsideration is respectfully requested.

The proposed combination would not have suggested a negative electrode material made of carbon fibers and carbon flakes disposed in a particulate carbon negative electrode active material.

EP 0 871 233 discloses a nonaqueous electrolyte secondary cell in which flaky graphite is added to the granulated carbon conductive agent used to form the negative electrode. As recognized by the examiner, EP 0 871 233 does not disclose nor would it have suggested additionally including carbon fibers in the conductive material.

JP 09-027344 discloses a nonaqueous electrolyte secondary cell in which a mixture of flaky graphite and fibrous carbon are added to the $LiMO_2$ conductive agent used to form the positive electrode. The examiner suggests that, "It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the carbon granules in EP 0 871 233 A1 with the carbon fibers of JP 09-027344 because they both seve the same purpose of maintaining the structural integrity of the electrode . . ."

Applicant's respectfully disagree. First, the carbon granule in EP 0 871 233 A1 are present as the conductive material. They do not provide structural integrity. Therefore, the carbon granules and the carbon fibers do not both serve the same purpose and it would not have been obvious to replace one with the other. Furthermore, the conductive materials used to form a positive electrode and a negative electrode are very different materials, $LiMO_2$ versus particulate carbon. Consequently, it would not have been obvious that a combination of materials that are useful in maintaining the structural integrity of $LiMO_2$ would also be useful in maintaining the structural integrity of particulate carbon.

JP 09-027344 would actually appear to teach away from the examiner's position. JP 09-027344 discloses a nonaqueous electrolyte secondary cell having a negative electrode. If it would have been obvious to include a mixture of flaky graphite and fibrous carbon to enhance the structural integrity of the electrode why was it not suggested in JP 09-027344? Therefore, claims 1-27 would not have been obvious in light of a combination of EP 0871233 and JP 09-027344 A and the rejection of these claims under 35 U.S.C. § 103(a) should be withdrawn.

The examiner also rejected claims 10, 22, 23, and 25, the claims additionally reciting that the nonaqueous electrolyte solution comprises a mixture of ethylene carbonate and dimethyl carbonate (claims 10 and 25) or that the positive electrode and the negative electrode further comprise a binder, including a polyvinylidene fluoride binder (claims 22 and 23), under 35 U.S.C. § 103(a) as obvious in light of a combination of JP 08-287952 and EP 0871233 .

Reconsideration is respectfully requested. The proposed combination would not have suggested a negative electrode material made of carbon fibers and carbon flakes disposed in a particulate carbon negative electrode active material.

As discussed above, JP 08-287952 discloses an nonaqueous electrolyte secondary battery having a negative electrode formed with two distinct layers of carbon material. A layer of spherical graphite is formed so that it contacts the collector. A second layer of scale-shaped graphite is then formed on the surface of the electrode. Fibered graphite can be added to either or both of the two layers. This reference does not disclose a negative electrode formed with both carbon fibers and carbon flakes disposed in the particulate negative electrode active material.

EP 0871233 is cited merely because it discloses an electrolyte solution comprising a mixture of ethylene carbonate and dimethyl carbonate and a polyvinylidene fluoride binder. Consequently, nothing in a combination of JP 08-287952 and EP 0871233 would have suggested a negative electrode formed with both carbon fibers and carbon flakes disposed in the particulate negative electrode active material. Therefore, the rejection of claims 10, 22, 23, and 25 under 35 U.S.C. § 103(a) as obvious in light of this combination of references should be withdrawn.

CONCLUSION

In light of the foregoing amendment and remarks, it is believed that the application is in condition for allowance, so that a prompt and favorable action is respectfully solicited.

Respectfully submitted,

SONNENSCHEIN NATH & ROSENTHAL

June 18, 2002

By: _____
Jeffrey F. Craft
Reg. No. 30,044

SONNENSCHEIN NATH & ROSENTHAL
P.O. Box #061080
Wacker Drive Station
Sears Tower
Chicago, IL 60606-6404
(213) 623-9300

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June , 2002
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Jeffrey F. Craft

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Version with Marking to Show Changes Made

In the specification

The paragraph beginning at page 7, line 22 has been replaced with the following paragraph:

"In this embodiment, as shown in Fig. 1, the negative electrode 5 comprises particles 17 of a negative-electrode active material which are bonded to each other with a binder (not shown in the drawing) on the collector 20 composed of, for example, copper. The negative electrode 5 further includes carbon fibers 18. Since the carbon fibers 18 are thin and long compared to the particles 17, these are disposed in the interstices between the negative-electrode active material particles 17. Since the nonaqueous electrolyte solution can be immersed in the overall interstices between the negative-electrode active material particles 17, this configuration can improve the retention of the nonaqueous electrolyte solution. In the present invention, carbon flakes 19 are also included in the negative-electrode active material particles 17. Since the carbon flakes 19 are flat and have high electron conductivity due to high crystallinity, the flakes enter the interstices between the negative-electrode active material particles 17 and improve the contact between these particles 17, resulting in improvement in conductivity between the negative-electrode active material particles 17."

In the claims

Claims 1, 13, 18, 22, and 27 have been amended as follows:

1. (amended) A nonaqueous electrolyte secondary battery comprising:

a positive electrode comprising a positive-electrode active material;

a negative electrode comprising a particulate negative-electrode active material, the positive-electrode active material and the negative-electrode active material capable of intercalating/deintercalating lithium; and

a nonaqueous electrolyte solution;

wherein the negative electrode further comprises carbon fibers and carbon flakes disposed in the particulate negative electrode active material, wherein the ratio by weight of the carbon fibers to the carbon flakes in the negative electrode is in a range of 0.2 to 100.

13. (amended) A nonaqueous electrolyte secondary battery comprising an electrode composite and a [nucleic acids] nonaqueous electrolyte solution, the electrode composite comprising a positive electrode comprising a positive-electrode active material and a negative electrode comprising a particulate negative-electrode active material, the positive electrode and the negative electrode being wound by several turns together with a separator disposed therebetween,

wherein the negative electrode further comprises carbon fibers and carbon flakes disposed in the particulate negative electrode active material, wherein the ratio by weight of the carbon fibers to the carbon flakes in the negative electrode is in a range of 0.2 to 100.

18. (amended) A nonaqueous electrolyte secondary battery according to claim 13, wherein the carbon flakes have an average diameter of 0.5 to 50 μm and an average [length] thickness of 0.01 to 1 μm.

22. (amended) A nonaqueous electrolyte secondary battery according to claim 19, wherein the positive electrode and the negative electrode further comprises a binder selected from the group consisting essentially of a polyvinylidene fluoride, a polytetrafluoroethylene, an ethylene-propylene-diene copolymer, and a styrene-butadiene rubber.

[26] 27. (amended) A nonaqueous electrolyte secondary battery according to claim 25, wherein the electrolyte solution comprises $LiPF_6$.